Nutrition News

PUBLISHED BY NATIONAL DAIRY COUNCIL - CHICAGO

NUTRITION AND PERFORMANCE

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Ancient observations and controlled modern experimental investigations show that a prolonged and acute deficit in the amount of food or an imbalanced food intake will, eventually, result in a serious impairment of performance capacity.

The effects of inadequate nutrition on performance capacity depend on the type and duration of the dietary deficit as well as on the type of performance involved. In vitamin A deficiency the effect in adult individuals is specific and produces a deterioration of the capacity for dark adaptation. It limits the usefulness of the affected night watchman, foot soldier or flyer for night operations. In a short but severe thiamine deficiency, strength is affected minimally while coordination may be seriously disturbed. In prolonged caloric deficiency many aspects of performance capacity suffer, but in different degrees. Endurance in physical work decreases to low levels. Decrement in strength is less serious but still dramatic, while coordination and speed of movement are more resistant to deterioration.

Performance and Fatigue

A comprehensive, unbiased approach to the study of performance in relation to diet must include a consideration of the physiological characteristics of the human organism. To be considered too, are the individual and social factors involved in the initiation, direction and maintenance of behavior, including occupational activity.

In prolonged starvation, self-initiated intellective activity decreases markedly even though the intellective capacity remains intact. This points out the need to differentiate between the effects of inadequate nutrition on performance capacity and on motivation. Actual work performance may be expected to deteriorate faster than the physiological state of fitness would indicate.

The importance of the specific organ systems involved in performance has been pointed out. Under conditions of starvation, light work with a premium on vision and neuromuscular coordination, would suffer less than heavy physical work depending on muscular (strength) and the cardiorespiratory factors.

Under conditions of inadequate food intake, several factors may contribute to decreased work output. Increased fatigability, so characteristic for a variety of dietary deficiencies, may serve as a regulatory and protective mechanism. Also, because of a tendency of the body to maintain a relatively constant weight, a reduction in food intake (i.e., decrease in caloric input) brings about a semiautomatic reduction in work effort (caloric output).

A New Approach Needed

Experimental investigations of the characterization of performance capacity have adequately covered deficiencies of the main nutrients. Yet, scientific information on the relationship between diet and creativity, intellective performance or prolonged awareness is outweighed by pseudoscientific lore. Operation of "space travel" vehicles, from today's atomic powered submarines traversing long distances under sea and beneath the polar ice crust, to the interplanetary ships of aftertomorrow, poses new problems of "human engineering," in which diet cannot be neglected.

The average industrial worker performs work that is physically easy but which may be emotionally tiring. The "stress" is on his central nervous system rather than on his muscular and cardiorespiratory systems. The physiological bases of fatigue resulting from light industrial work are poorly understood. In this age of modern industry and in the absence of gross nutritional deficiencies the significance of food—beyond a pleasant accompaniment to rest pauses—is largely unknown.

Dr. Brožek

The consumption of food by normal men results in significant changes in the electrocardiogram; this indicates that the immediate effects of meals cannot be passed by simply as being "subjective." We must search for objective neurophysiological criteria of the more subtle effects of nutrition on the central nervous system. As far as we know, the Laboratory of Higher Nervous Activity, in the Institute of Nutrition, Academy of Medical Sciences, Moscow, is at present the only research establishment specifically concerned with this problem.

A study of the role of nutrition in the functioning of the central nervous system, so crucial in a "push-button" civilization, has been neglected by our own researchers. Future progress will depend on the imaginative development of more sensitive methods and on a closer integration of the biochemical, neuro-physiological and the behavioral approaches.

DECEMBER, 1958 · · VOLUME 21 · · NUMBER 4

Glances AT NUTRITION RESEARCH

These studies demonstrate that nutritional value of foods is dependent upon availabilities and interrelationships of nutrients as well as upon amounts of each nutrient present in foods and in the total diet.

Milk protein is well utilized—Children recovering from kwashiorkor absorb and retain protein from milk more efficiently than from protein provided by a combination of beans and peanuts or peanut flour or soybean flour. This was demonstrated by nitrogen balance studies conducted on 18 African children 3-7 years of age after 5 weeks of treatment. The test foods were added to a basal diet consisting of rice, bread, banana flour, butter, palm oil, sugar and fruits. About ¾ of the dietary protein was supplied by the test foods. The children consumed 75-110 cal. per kgm. of body weight per day.

—J. Nutrition 65:335 (July) 1958.

Natural foods best protein source—Fewer calories are needed to maintain body weight and more nitrogen is retained when amino acids are provided by natural foods than when provided in comparable amount by purified amino acids. This was demonstrated by nitrogen balance studies conducted with 7 healthy women subjects aged 17-19 years. Those young women required 45-47 cal. per kgm. of body weight per day when 12 amino acids were supplied in purified diets but only 30-40 cal. per kgm. when these amino acids were supplied by wheat or corn. This study demonstrated the usefulness of alternately feeding amino acids in purified form and as present in foods to test availability of amino acids from foods. Valine was as available from corn as when purified.

—J. Nutrition 65:441:455 (July) 1958.

Milk protein needs no supplement—Data from study of 17 severely malnourished children showed they absorbed and retained cow's milk protein very well as judged by positive nitrogen balance, elevation to normal of the protein components in blood, and improved clinical picture. Adding lysine to cow's milk did not improve its utilization. Many of the children were unable to absorb and retain the protein from a combination of beans and corn even though daily intake of essential amino acids from this combination met or exceeded infant requirements and levels obtained from cow's milk. Addition of lysine and tryptophan improved retention of protein from the bean and corn diet. The children were malnourished from eating a poor diet with very little food of animal origin. They had low blood levels of total amino acids and of albumen which were elevated to normal when milk was given.

—Am. J. Clin. Nut. 6:495 (Sept.-Oct.) 1958.

Niacin-equivalents of some foods—Niacin plus tryptophan content of selected foods have been calculated as niacin-equivalents per 1000 calories as follows: cow's milk, 12.4; human milk, 9.84; beef round, 46.0; whole eggs, 10.8; salt pork, 2.17; wheat flour, 7.43; and corn grits, 3.00.

—J. Am. Diet. Assn. 34:914 (Sept.) 1958.

Dr. Josef Brožek

Dr. Brožek spent his boyhood in Melnik, Czechoslovakia. He did his undergraduate work at the Masaryk Realgymnasium in Plzen, and in 1937 received his Ph.D. in phychology from Karlova Universital, Prague. In 1939, Dr. Brožek came to this country to attend first the University of Pennsylvania, and later the University of Minnesota.

The multiple responsibilities of marriage, an assistant professorship, and the citizenship of his adopted country were taken on by Dr. Brožek in 1945. Since then he has continued his research and teaching activities at the University of Minnesota.

Dr. Brožek is a member of the American Psychological Association, the American Public Health Association, and the American Society of Physiology. He has served as associate editor of Nutrition Reviews, and as editor of "Human Biology" in 1953.

Food for Space

Dr. Robert H. Lueck, Vice-President of Research, American Can Company, reports aluminum squeeze tubes filled with flavored milks, semi-solid beef and ham, or fruit juices are being prepared for feeding men in space suits. Air force personnel will test the tubes at extremely high altitudes.

The United States Quartermaster Food and Container Institute says that this new feeding device markedly reduces the weight of high altitude feeding containers, since each aluminum tube weighs only nine grams.

HEALTH CLASS SPURS SCIENCE FAIR

Marjorie S. Hedgepeth, Teacher
Old Town School, Winston-Salem, North Carolina

The vital role of health to learning, and the importance of pupils learning to live and work with each other, as we well know, is basic to emotional, social and physical development. Unfortunately, health as a subject can sometimes be taught in a rather "cut and dried" fashion. As another school year approached, I wondered just how health education might be enriched as a learning experience for my pupils? What methods could be used in achieving the objective of better health? Should we try an animal feeding experiment in the classroom?

I projected this idea to the class, as thirty seventh-grade pupils at Old Town School began their health study in the fall of 1957. It was accepted enthusiastically. First, we took a food survey of the food intake of pupils for about a week. These were checked with the class. We used the chart, "A Guide to Good Eating" as a reference guide. Our survey revealed that many of the pupils were eating less than the recommended amounts of green and yellow vegetables, fruits and dairy foods. A lively discussion and study of the function of the nutrients in these foods and their relation to the health and well-being of this "younger set" got underway.

Next, three committees, selected by the students, made plans for the animal feeding experiment. We contacted the Dairy Council of Winston-Salem regarding the possibility of securing advice about the experiment. The class decided to carry on the experiment in the spring and during the intervening time they continued to make preparations. There were animal cages to be made; the care and feeding of experimental animals to be studied; and the planning of the experimental diets to be discussed and agreed upon.

The day for the arrival of the animals finally came. How excited the pupils were! The experiment was carried on for six weeks. One rat was given a diet which the class agreed was a typical one of pre-teens who were careless about food. The other rat was given a carefully selected diet containing recommended amounts from the four important food groups. The rats were weighed at the end of each week. Every effort was made to carry on this experiment as scientifically as possible. Growth charts were kept by one committee. The cages were carefully cleaned by another. The behavior, as well as the physical development of the animals, was observed and recorded.

At the end of the experiment the pupils could readily relate the importance of an adequate diet to the growth and repair of their own body tissues. Some practical, and we hope lasting applications, of this experiment were: (1) Improved eating habits of pupils were observed at snacktime as well as in the school lunchroom. (2) Pupils learned to work more harmoniously together in committees. (3) The need for proper care of animals became first-hand knowledge. (4) The animal feeding experiment was the major factor in motivating our seventh-grade pupils to have a science fair. At this fair the class displayed all of their science projects. The entire school with an enrollment of 1,260 pupils was invited to attend. Our animal feeding experiment had grown from an idea into a succesful experience in health education and science for the teacher, her seventh-grade students and the school.

"MEALS ON WHEELS"

Margaret Toy, Counselor
"The Lighthouse," Philadelphia, Pennsylvania

What is "Meals-On-Wheels"? It is a service designed to meet a serious and growing need of older citizens. This program prepares and delivers properly planned hot meals to the homes of elderly people who are physically unable to purchase and prepare food at home, to go out to a restaurant, or have no friends or relatives to help them.

The Lighthouse settlement house has come to know of many cases where older people find it hard to get even one satisfying, nutritious meal a day. Living alone, either bedridden or too feeble to go out regularly, they eat canned or dried foods or depend on a friendly neighbor for their meals. This ever-increasing need is attested to by the experiences of visiting nurses and hospital staffs, called upon when health breaks down.

We serve a thickly populated, working class residential area in North Philadelphia. About 9 percent of the population in this area is over 65, and nearly 300 persons out of a total of 89,000 are over 85.

Through the Columbia area of the Health and Welfare Council, The Lighthouse was asked to establish a program by which one hot meal a day, and perhaps one cold meal, could be brought to people confined to their homes. With a grant from the Henrietta Tower Wurts Memorial Foundation, the program began on January 18, 1953.

Five days a week The Lighthouse delivers one hot and one cold meal to an average of forty older persons living in the Kensington area. The meals are prepared in the settlement house kitchen with the aid of a paid cook and several volunteers under the supervision of the professional worker responsible for the program. The hot meal is served on a divided heated paper plate, securely covered with foil, and delivered in a pre-heated insulated bag. Milk is delivered in half-pint cartons. Tea, coffee or soup is carried in thermos bottles. The meals are taken out of the insulated bags by the server and the bag returned to The Lighthouse kitchen.

The food is delivered in a specially equipped walk-in truck donated by a local service organization, and by Lighthouse station wagons. Handling delivery on the three daily routes are volunteers—some of them teenagers, and our own staff.

Our clients are referred to us by local hospitals concerned about the need of proper diet for released patients. The Visiting Nurse Society, in its program, discovers older people whose health is endangered by lack of an adequate diet and they make refer-

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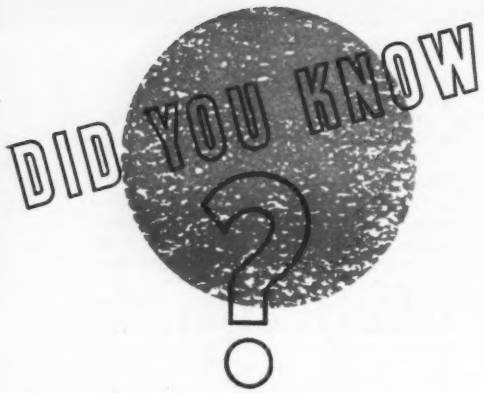

—that for every dollar spent in the U.S.A. for food, eight cents represents transportation costs?

—that one-half cup of raw or cooked carrots supplies more than the daily recommended allowance for vitamin A?

—that a liquid plastic used in making jet planes gave excellent results when tested as an insulator for milk-tank trucks?

—that California leads all states in milk production per cow, with an average of 8,880 pounds per cow?

—that until it is clearer which fats are more desirable nutritionally, and which if any are undesirable, the National Academy of Sciences finds no need for a major change in our diets?

—that Dr. I. L. Hathaway, University of Nebraska, in studying 31 cheeses, found Camembert, Liederkranz, and Blue cheese were highest in vitamin B_6 content?

—that the skin as the largest body organ, is only second to the brain in complexity?

—that at the First Annual Brazilian Food Exposition, July 1958, thousands of our South American neighbors sampled American-made foods, including fresh re-combined milk, cheddar cheese and the biggest hit of the show—ice cream?

THINGS YOU'LL LIKE TO READ

If not already in your ready-reference file, we recommend these three important reports from the Food and Nutrition Board of the National Academy of Sciences - National Research Council, Washington, D. C.

Publication 589—**Recommended Dietary Allowances.** Rev. 1958. A guide for planning adequate diets for normal, healthy, moderately active people. This revision gives no recommended allowances for the first month of life, since breast feeding is the desired procedure for meeting the nutritional needs of the newborn. Calorie intakes for adults are down slightly as are the iron allowances for the adult male. Calorie allowances of children from 1 to 12 years of age are increased but 13-15 year old boys are decreased in calories. Thiamine allowances based on 0.5 mg. per 1000 calorie intake remain substantially the same. Niacin allowances are now expressed as niacin equivalents, assuming 60 mg. of the amino acid tryptophane to be converted by the body into 1 mg. of niacin, and are slightly higher. 36 pp. $1.00.

Publication 325 — **Sodium Restricted Diets, The Rationale, Composition and Practical Aspects of Their Use.** 1954. Report considers physiological principles involved in the use of "sodium-restricted diets," possible harm in treating of disease, the planning and administration of the diet. 71 pp. $1.00.

Publication 575—**The Role of Dietary Fat in Human Health.** 1958. A review of the fundamental information on the role of fat in human nutrition so as to consider whether changes in kind or quality of food fat would be beneficial, to ascertain whether the facts available warrant any conclusions, and to point out where research is needed to give us the necessary information. 31 pp. $1.00.

Amino Acid Content of Foods. Home Economics Research Report #4. 1957. U. S. Dept. of Agriculture. Available from U. S. Government Printing Office, Washington, D. C. 45c. This 82-page booklet presents in tabular form for ready use, the average values that at present appear to be the most suitable for estimating the amino acid content of foods, dietaries, and food supplies. The values as shown are tentative and will be revised as improved analytical methods make new data available.

"MEALS ON WHEELS"

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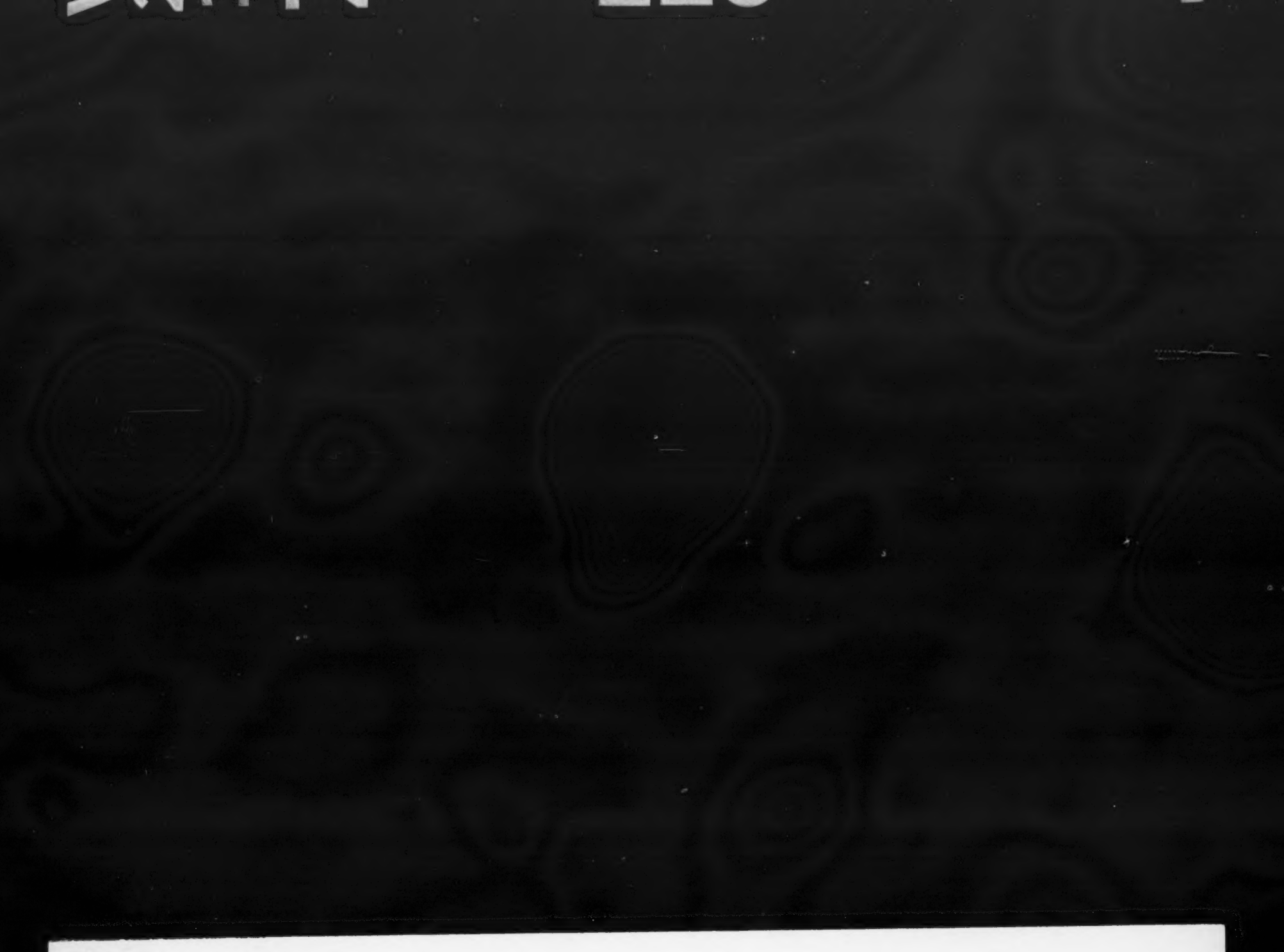
rals. Still others are referred by the Department of Public Assistance.

No free meals are delivered. The people pay for their meals on a sliding scale. Daily fees for "Meals-On-Wheels" service average 42 cents and the minimum is 30 cents. If the person can pay a higher fee, it is suggested. Every effort is made to maintain the dignity of the "shut-in."

Dr. Stanley A. Tauber, a nutritionist on the advisory committee for "Meals-On-Wheels" says, "Many of the physical findings in these people are caused by long-standing faulty dietary habits and are now chronic and irreversible. There has been an observable beneficial effect when nutritional needs were met even partially. The stimuli of independent living help maintain mental and physical vigor by demanding their constant exercise, avoiding the lapses that take place when these stimuli are removed by the sheltered existence of institutional life.

" 'Meals-On-Wheels' has provided other valuable services in referrals of clients to other agencies, and in securing aid and attention of the client's family. We believe this is a practical approach in care of the aged."